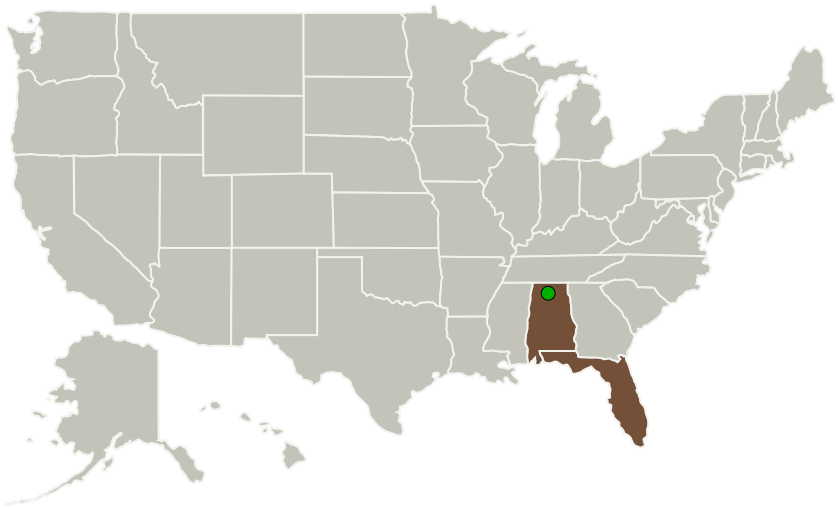
The Vulcan Advanced Hybrid Manufacturing System, Phase I

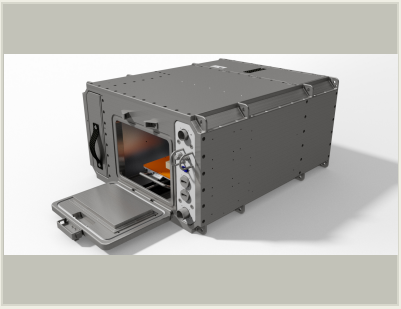
Completed Technology Project (2017 - 2017)

Project Introduction

Made In Space is developing the The Vulcan Advanced Hybrid Manufacturing System (VULCAN) to address NASA's requirement to produce high-strength, high-precision components on-orbit with comparable quality to commercially-available, terrestrial machined parts. Such capability enables the in-situ manufacturing of critical parts for human spaceflight and without dependence on terrestrial resupply. Made In Space integrates flight-proven microgravity process controls and payload support systems, such as environmental and master controls, with a modular manufacturing & tool system that generates a near net shape for surface finishing or other industrial processing into the final product. One of the key innovations of Made In Space's VULCAN is the ability to produce finished metal parts with one device, eliminating the need for separate additive manufacturing and subtractive machining facilities. The wire feed architecture of both the thermoplastic extruder and metal manufacturing head allows the hardware to be interchangeable and supported on the same gantry without requiring modification of any of the components. The two manufacturing heads follow the SBM-Spec interface standards for 'plug-and-play' operation. Thus, the manufacturing heads can be exchanged easily by crewmembers with no formal manufacturing training. Using this capability, the VULCAN device produces both non-metallic and metallic replacement parts with a minimum of crew interaction. VULCAN is scalable and supports the open SBM-Spec architecture for the thermoplastic and metal manufacturing heads, resulting in a manufacturing methodology that uses multiple materials and can be upgraded over time.

Primary U.S. Work Locations and Key Partners





The Vulcan Advanced Hybrid Manufacturing System, Phase I Briefing Chart Image

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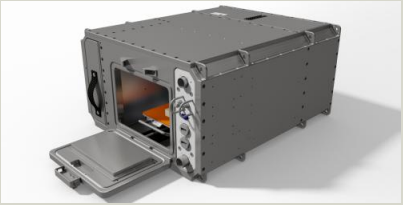
Organizations Performing Work	Role	Type	Location
Made in Space, Inc.	Lead Organization	Industry	JACKSONVILLE, Florida
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Florida

Images



Briefing Chart Image
The Vulcan Advanced Hybrid Manufacturing System, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/136297)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Made in Space, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

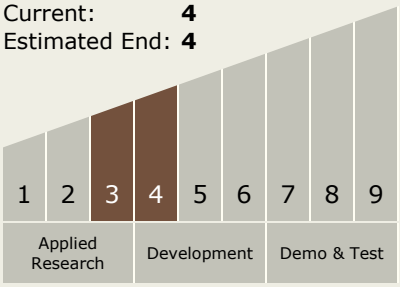
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Michael Snyder

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.1 Manufacturing Processes